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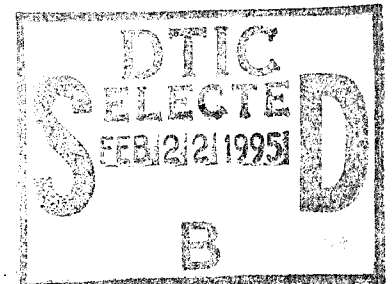
PHYSICAL TRAINING ACTIVITIES OF EAST COAST

U.S. NAVY SEALS

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**Physical Training Activities of East Coast
U.S. Navy SEALs**

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SUMMARY

Problem.

U.S. Navy Sea-Air-Land (SEAL) personnel often conduct physically demanding missions under highly stressful conditions. The missions, conducted in both terrestrial and maritime environments, frequently require high levels of both aerobic (muscular and cardiorespiratory endurance) and anaerobic (muscular strength and power) fitness. SEALs must maintain fitness while undergoing extensive operational training that may limit the availability of physical training time.

Objective.

This survey was conducted to document the aerobic, strength, and overall conditioning programs of Navy SEALs on the East Coast and to serve as a baseline for future studies evaluating the effectiveness of self-selected training programs in maintaining physical fitness. A study on SEALs assigned to West Coast commands has been reported previously by Prusaczyk, Goforth, and Nelson (1990).

Approach.

A detailed physical training activity questionnaire was administered to 75 East Coast U.S. Navy Sea-Air-Land (SEAL) personnel undergoing advanced training. Questions were designed to document the mode (type), duration, frequency, and intensity of exercise and the locations/facilities where the SEALs engaged in regular physical fitness training. The training activities were evaluated according to the American College of Sports Medicine guidelines for developing and maintaining aerobic and strength fitness.

Results.

Overall, these East Coast SEALs reported engaging in aerobic activities (running, swimming, bicycling) at frequencies, intensities, and durations adequate for maintaining aerobic fitness levels. Strength conditioning was also determined to be of sufficient volume to maintain current levels of muscular strength.

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Conclusions.

Although East Coast SEALs engage in physical training activities with sufficient volume and intensity to maintain current levels of physical fitness, there is evidence that SEALs can significantly improve both aerobic and anaerobic fitness with only 90 additional minutes of training per week (Jacobs, Prusaczyk, & Goforth, 1994). The effectiveness of the current training programs should be evaluated to ensure SEALs' ability to meet the most physically demanding tasks they may be required to perform (Stuster, Goforth, Prusaczyk & Meyer, 1994). Additionally, these data will serve as baseline data in other studies evaluating physical training programs for SEALs and to assist in the development of guidelines for avoiding detraining under conditions where appropriate equipment and training opportunities are limited (e.g., shipboard and submarine deployments).

INTRODUCTION

U.S. Navy Sea-Air-Land (SEAL) personnel often conduct physically demanding missions under highly stressful conditions (Stuster, Goforth, Prusaczyk, & Meyer, 1994). The missions, conducted in terrestrial and maritime environments, frequently require high levels of both aerobic (muscular and cardiorespiratory endurance) and anaerobic (muscular strength and power) fitness. In fact, it has been suggested that SEALs rely on their physical fitness more than any other U.S. military component (Barnes & Strauss, 1986). Because of the physical demands of their missions, SEALs are required to maintain higher fitness standards than other Navy personnel (BUPERS Manual 1410-380).

Physical fitness levels and anthropometric profiles of SEALs and Basic Underwater Demolition/SEAL (BUD/S) students have been documented previously (Beckett, Goforth, & Hodgdon, 1989). These data showed that BUD/S students and platoon SEALs have relatively high aerobic fitness, with mean peak oxygen uptakes ($\dot{V}O_{2peak}$) of $62.4 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ and $57.7 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, respectively. SEALs also have a high mesomorphic (i.e., muscularity) component (5.8 ± 0.9) on the Heath-Carter somatotype scale (Carter, 1980). Interestingly, mesomorphy scores for BUD/S students graduating in 1989 (5.8 ± 0.8 ; Beckett et al., 1989) were not different from those graduating in 1973 (5.9 ± 1.5 ; Carter & Rahe, 1973).

Maximal aerobic power, measured as $\dot{V}O_{2peak}$, is a laboratory measure used to evaluate maximal energy output by aerobic processes (Åstrand & Rodahl, 1977) and is an indicator of the ability to perform endurance activities. While it has been suggested that U.S. Army Special Forces (SF) soldiers have the highest aerobic power of any U.S. military population (Muza, et al., 1987), Beckett and colleagues (1989) documented a mean $\dot{V}O_{2peak}$ for SEALs that was more than 6% higher than Army SF personnel. Although the $\dot{V}O_{2peak}$ of these platoon SEALs was higher than the Army SF, it was significantly lower (8%) than recent BUD/S graduates. The decrement in $\dot{V}O_{2peak}$ cannot be ascribed solely to the age difference (22 ± 2 yr for BUD/S and 26 ± 4 yr for SEALs). Instead, the decrease may reflect reduced physical training volume or intensity and a shift toward increased operational readiness training.

To maintain the levels of aerobic and anaerobic fitness required for full mission capability, SEALs perform regular physical training with their platoons or detachments. In addition, most

SEALs engage in other physical training activities (Barnes & Strauss, 1986). These activities include individual physical training, skilled activities, and team sports. Analysis of SEALs' physical training activities could provide basic information on the effectiveness of the overall training program for maintaining mission-related fitness. The mission of SEALs on the two coasts is often viewed as somewhat different (Stuster, Goforth, & Prusaczyk, 1993; Stuster, et al., 1994); therefore, documentation of the physical training activities of SEALs from the two coasts was undertaken. Data on the physical training activities of SEALs from West Coast commands (SEAL Teams One, Three, and Five and SDV Team One) has been reported previously by Prusaczyk, Goforth, and Nelson (1990). This survey was conducted to document the aerobic and strength conditioning programs of East Coast U.S. Navy SEALs and to evaluate the effectiveness of the self-selected training programs in maintaining physical fitness.

MATERIALS AND METHODS

Physical activity questionnaires (Appendix A) were distributed to East Coast SEALs undergoing advanced operational training. The SEALs were involved with one of eleven different courses or activities: 1) Combat Swimmer, 2) Land Warfare, 3) Maritime Operations, 4) Cold Weather Training, 5) Classroom Preparation, 6) Stand-Down Preparation, 7) Mission Preparation, 8) Exercises, 9) Field Activities, 10) Core Training, or 11) Advanced SDV Training. The questionnaires were used to collect data on the characteristics of SEALs' physical training activities, including the type of fitness activities (i.e., aerobic, anaerobic, skill/sport, etc.); frequency, duration, and intensity of participation; and the locations and conditions of training. Descriptive statistics were computed for each question using SPSS-X Release 3.1 for VAX/VMS on the Naval Health Research Center's VAX 6000, Model 310 computer.

RESULTS

Physical Training Activities.

A total of 75 questionnaires were completed and returned from the East Coast SEALs. The data in the tables below are based on the responses provided by the SEALs. The statistics are based on the total number of individuals responding on each question. The number of SEALs engaging in individual physical conditioning activities and the mean frequencies with which they engaged in the activities are presented in Table 1.

Table 1. Frequency of participation (times per week) in fitness activities during advanced training.

| ACTIVITY | N | % N | MEAN | SD |
|-----------------|----|-----|------|-----|
| Running | 74 | 99 | 4.0 | 1.3 |
| Swimming | 72 | 96 | 1.8 | 1.2 |
| Calisthenics | 68 | 91 | 4.0 | 1.4 |
| Obstacle Course | 67 | 89 | 1.6 | 1.2 |
| SCUBA/Snorkel | 65 | 87 | 1.4 | 1.1 |
| Weight Training | 62 | 83 | 2.9 | 1.6 |
| Bicycling | 46 | 61 | 2.5 | 1.7 |
| Walking | 17 | 23 | 3.8 | 2.7 |
| Rowing | 16 | 21 | 1.8 | 1.6 |
| Aerobics Class | 8 | 11 | 2.8 | 2.0 |

Legend: ACTIVITY is the type of exercise in which SEALs engaged.

N is the number of SEALs engaging in the activity.

% N is the percent of 75 SEALs who reported engaging in the activity.

MEAN is the arithmetic mean of the responses.

SD is the standard deviation about the mean.

The number of SEALs reporting participation in skill or team sport activities and the frequency with which they participated are summarized in Table 2.

Table 2. Frequency of participation (times per week) in skill, team, and other activities during advanced training.

| ACTIVITY | N | % N | MEAN | SD |
|------------------------|----|-----|------|-----|
| Volleyball | 31 | 41 | 1.4 | 1.2 |
| Racket Sports/Handball | 23 | 31 | 1.5 | 1.5 |
| Baseball/Softball | 22 | 29 | 1.8 | 1.6 |
| Basketball | 21 | 28 | 2.2 | 1.8 |
| Football | 19 | 25 | 1.4 | 1.4 |
| Martial Arts | 15 | 20 | 2.8 | 1.8 |
| Boxing/Wrestling | 12 | 16 | 1.8 | 1.8 |
| Other | 6 | 8 | 2.8 | 2.1 |

Legend for Table 2 is the same as for Table 1. [The data presented reflect the mean responses of those providing the information.]

The characteristics of running, the most frequently employed method of aerobic training, are summarized in Table 3. This table outlines frequency, duration, volume, and intensity of running. To determine total running time per week, the product of frequency (4.1 times per week) and duration (46.1 min per run) was calculated. The mean frequency-duration product was 189 minutes of running per week.

Only 17% of SEAL respondents reported running while carrying a load (e.g., backpack), while 20% reported load carriage while walking. The mean (\pm SD) pace in minutes per mile was 9.9 min (\pm 1.2 min) for running and 17.4 min (\pm 12.7 min) for walking.

Table 3. Characteristics of running as a physical training activity among East Coast SEALs.

| ATTRIBUTE | N | % N | MEAN | SD |
|------------------------------|----|-----|------|------|
| Frequency (times per week) | 38 | 51 | 4.1 | 1.0 |
| Duration (minutes per run) | 38 | 51 | 46.1 | 26.3 |
| Intensity (minutes per mile) | 39 | 53 | 7.5 | 0.7 |
| Volume (miles per week) | 37 | 50 | 20.5 | 8.3 |

Legend: ATTRIBUTE is the characteristic of running described.

N is the total number of SEALs reporting on the attribute.

% N is the percent of SEALs reporting on the attribute as a percent of those reporting engaging in the activity (Table 1).

MEAN is the arithmetic mean of responses for the attribute.

SD is the standard deviation about the mean.

Table 4 summarizes the frequency with which SEALs train on various surfaces (running), locations and equipment used for aquatic activities (swim/scuba/snorkel), and equipment used (bicycle and rowing machines). Table 5 summarizes the frequency with which SEALs use various training surfaces for skill and team sport activities.

Table 4. Frequency of use (times per week) of various physical training surfaces, locations, and equipment for aerobic activities.

| ACTIVITY | LOCATION/SURFACE | N | % N | MEAN | SD |
|----------------------|------------------|----|-----|------|-----|
| Running | | | | | |
| | Sand | 71 | 96 | 2.0 | 1.2 |
| | Dirt | 66 | 89 | 2.5 | 1.4 |
| | Grass | 57 | 77 | 2.7 | 1.6 |
| | Asphalt | 72 | 97 | 3.1 | 1.4 |
| | Concrete | 54 | 73 | 2.6 | 1.6 |
| | Track | 11 | 15 | 1.6 | 1.5 |
| SCUBA/Snorkel | | | | | |
| | Pool | 28 | 43 | 1.1 | 0.6 |
| | Ocean | 64 | 98 | 1.3 | 0.8 |
| | with Fins | 62 | 97 | 1.4 | 1.0 |
| | without Fins | 17 | 27 | 1.4 | 0.8 |
| Swimming | | | | | |
| | Pool | 51 | 71 | 1.5 | 1.0 |
| | Ocean | 68 | 94 | 1.3 | 0.6 |
| | with Fins | 64 | 89 | 1.4 | 0.9 |
| | without Fins | 39 | 54 | 1.6 | 1.0 |
| Bicycling | | | | | |
| | Road | 42 | 91 | 2.3 | 1.5 |
| | Stationary | 15 | 33 | 1.7 | 1.2 |
| Rowing | | | | | |
| | Boat | 10 | 63 | 1.1 | 0.3 |
| | Machine | 11 | 69 | 1.4 | 0.8 |

Legend for Table 4 is the same as for Table 1.

Table 5. Frequency of use (times per week) of physical training surfaces for skill and team sport activities.

| ACTIVITY | SURFACE | N | % N | MEAN | SD |
|-------------------------|----------|----|-----|------|-----|
| Racquet Sports/Handball | | | | | |
| | Wood | 18 | 78 | 1.1 | 0.2 |
| | Asphalt | 5 | 22 | 1.0 | 0.0 |
| | Concrete | 10 | 45 | 1.0 | 0.0 |
| Basketball | | | | | |
| | Wood | 15 | 71 | 1.6 | 1.0 |
| | Asphalt | 10 | 48 | 1.4 | 0.8 |
| | Concrete | 12 | 57 | 1.3 | 1.3 |
| Volleyball | | | | | |
| | Sand | 29 | 94 | 1.4 | 1.0 |
| | Grass | 13 | 42 | 1.0 | 0.0 |
| | Wood | 9 | 29 | 1.1 | 0.3 |
| | Asphalt | 3 | 10 | 1.0 | 0.0 |
| | Concrete | 4 | 13 | 1.0 | 0.0 |

Legend for Table 5 is the same as for Table 1 with the addition of surface upon which the activity was performed.

Eighty-three percent of the SEALs reported engaging in weight training as an activity. Overall, weight training focused on upper body exercises. Detailed descriptions of the number of sets performed, number of repetitions per set, weights used, duration of exercise, perceived effort, and the one-repetition maximal (1-RM) weight lifted are presented in Table 6. Weight training sessions lasted an average of 59 ± 15 minutes (Table 7).

Tables 7 and 8 summarize the mean frequency, duration, and perceived intensity of SEALs' participation in each of the individual physical training activities and in the skill and team sports, respectively.

Table 6. Characteristics of East Coast SEALs' weight training exercise.

| Number of Sets | | | | |
|----------------------|----|------|-----|--------|
| EXERCISE | N | MEAN | SD | RANGE* |
| UPPER BODY EXERCISES | | | | |
| Neck | 16 | 3.4 | 1.7 | 1-9 |
| Upright Rowing | 27 | 3.7 | 1.5 | 1-9 |
| Bent Rowing | 23 | 4.0 | 1.6 | 1-9 |
| Bench Press | 43 | 4.5 | 1.8 | 1-9 |
| Military Press | 32 | 4.0 | 1.4 | 1-9 |
| Incline Press | 35 | 4.2 | 1.7 | 1-9 |
| Biceps Curl | 43 | 4.2 | 1.9 | 1-9 |
| Triceps Curl | 39 | 4.0 | 1.7 | 1-9 |
| Latissimus Pull | 16 | 4.1 | 1.6 | 1-9 |
| Wrist Curl | 19 | 3.8 | 1.2 | 1-6 |
| Sit-up | 15 | 4.1 | 2.1 | 2-9 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 15 | 1.1 | 0.5 | 1-3 |
| Squat | 15 | 3.9 | 1.4 | 1-6 |
| Leg Curl | 16 | 3.3 | 1.3 | 1-6 |
| Toe Raises | 16 | 3.5 | 1.3 | 1-9 |
| Leg Extension | 15 | 3.4 | 1.1 | 1-6 |
| Stair Climb | 4 | 3.3 | 0.5 | 3-4 |
| OTHER EXERCISES | | | | |
| Other | 5 | 5.2 | 2.3 | 3-9 |

*Range is range of response values reported.

Table 6. Characteristics of East Coast SEALs' weight training exercise (continued).

| Repetitions per Set | | | | |
|----------------------|----|------|------|-------|
| EXERCISE | N | MEAN | SD | RANGE |
| UPPER BODY EXERCISES | | | | |
| Neck | 15 | 11.6 | 6.5 | 3-30 |
| Upright Rowing | 27 | 10.0 | 1.9 | 4-13 |
| Bent Rowing | 23 | 10.2 | 1.3 | 6-13 |
| Bench Press | 43 | 10.0 | 2.7 | 1-20 |
| Military Press | 32 | 10.1 | 1.7 | 4-13 |
| Incline Press | 35 | 9.8 | 1.7 | 4-13 |
| Biceps Curl | 43 | 10.7 | 2.9 | 4-20 |
| Triceps Curl | 40 | 10.6 | 2.6 | 4-20 |
| Latissimus Pull | 35 | 10.4 | 2.8 | 4-20 |
| Wrist Curl | 19 | 12.4 | 4.9 | 9-30 |
| Sit-up | 13 | 37.5 | 31.7 | 10-99 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 15 | 11.7 | 5.1 | 10-30 |
| Squat | 15 | 7.3 | 1.8 | 5-10 |
| Leg Curl | 17 | 10.9 | 2.5 | 10-20 |
| Toe Raises | 15 | 15.2 | 7.1 | 10-30 |
| Leg Extension | 15 | 10.5 | 0.9 | 10-13 |
| Stair Climb | 5 | 13.6 | 6.4 | 10-25 |
| OTHER EXERCISES | | | | |
| Other | 5 | 11.8 | 4.7 | 8-20 |

Table 6. Characteristics of East Coast SEALs' weight training exercise (continued).

| Duration (minutes)* | | | | |
|----------------------|----|------|------|-------|
| EXERCISE | N | MEAN | SD | RANGE |
| UPPER BODY EXERCISES | | | | |
| Neck | 10 | 13.3 | 16.9 | 1-60 |
| Upright Rowing | 21 | 15.9 | 20.6 | 1-90 |
| Bent Rowing | 16 | 18.9 | 23.0 | 1-90 |
| Bench Press | 30 | 16.8 | 17.6 | 1-90 |
| Military Press | 24 | 16.2 | 19.2 | 1-90 |
| Incline Press | 25 | 16.6 | 18.7 | 1-90 |
| Biceps Curl | 29 | 15.9 | 18.0 | 1-90 |
| Triceps Curl | 28 | 15.3 | 18.0 | 1-90 |
| Latissimus Pull | 25 | 15.8 | 26.9 | 1-90 |
| Wrist Curl | 13 | 19.6 | 25.8 | 1-90 |
| Sit-up | 8 | 15.4 | 12.6 | 5-45 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 11 | 21.1 | 28.0 | 1-90 |
| Squat | 12 | 22.5 | 26.5 | 1-90 |
| Leg Curl | 12 | 19.8 | 27.1 | 1-90 |
| Toe Raises | 14 | 15.1 | 22.3 | 1-90 |
| Leg Extension | 12 | 20.0 | 26.9 | 1-90 |
| Stair Climb | 2 | 5.0 | 0.0 | 5- 5 |
| OTHER EXERCISES | | | | |
| Other | 5 | 8.6 | 3.0 | 5-12 |

* Duration (minutes): 0-(none); 1-(<11); 2-(11-20); 3-(21-30); 4-(31-40); 5-(41-50); 6-(51-60); 7-((61-119); 8-(120-180); 9-(> 180)

Table 6. Characteristics of East Coast SEALs' weight training exercise (continued).

| Weight used (pounds) | | | | |
|----------------------|----|-------|------|---------|
| EXERCISE | N | MEAN | SD | RANGE |
| UPPER BODY EXERCISES | | | | |
| Neck | 10 | 33.0 | 22.1 | 5- 90 |
| Upright Rowing | 25 | 89.0 | 38.3 | 20-180 |
| Bent Rowing | 20 | 122.1 | 57.1 | 25-190 |
| Bench Press | 40 | 184.6 | 46.0 | 100-280 |
| Military Press | 28 | 112.8 | 38.4 | 30-180 |
| Incline Press | 31 | 131.3 | 43.8 | 50-225 |
| Biceps Curl | 39 | 64.5 | 23.0 | 25-110 |
| Triceps Curl | 35 | 62.3 | 30.0 | 15-170 |
| Latissimus Pull | 31 | 144.5 | 53.8 | 50-220 |
| Wrist Curl | 15 | 48.3 | 24.7 | 15-100 |
| Sit-up | 5 | 53.0 | 85.2 | 10-205 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 12 | 123.8 | 53.8 | 40-200 |
| Squat | 13 | 203.3 | 82.8 | 80-350 |
| Leg Curl | 14 | 74.6 | 31.2 | 40-150 |
| Toe Raises | 11 | 134.1 | 67.2 | 10-220 |
| Leg Extension | 12 | 123.8 | 53.8 | 40-200 |
| Stair Climb | 2 | 75.0 | 35.4 | 50-100 |
| OTHER EXERCISES | | | | |
| Other | 4 | 103.8 | 64.2 | 35-190 |

Table 6. Characteristics of East Coast SEALs' weight training exercise (continued).

| One-repetition maximum (pounds) | | | | |
|---------------------------------|----|------|-------|---------|
| EXERCISE | N | MEAN | SD | RANGE |
| UPPER BODY EXERCISES | | | | |
| Neck | 6 | 35 | 18.7 | 5- 60 |
| Upright Rowing | 18 | 128 | 53.8 | 35-245 |
| Bent Rowing | 13 | 153 | 64.9 | 35-225 |
| Bench Press | 28 | 243 | 66.2 | 10-365 |
| Military Press | 21 | 154 | 47.2 | 90-285 |
| Incline Press | 23 | 175 | 61.6 | 65-275 |
| Biceps Curl | 26 | 88 | 40.5 | 20-180 |
| Triceps Curl | 26 | 79 | 40.8 | 15-190 |
| Latissimus Pull | 21 | 164 | 49.5 | 15-250 |
| Wrist Curl | 9 | 67 | 39.9 | 20-130 |
| Sit-up | 4 | 69 | 37.5 | 25-100 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 8 | 351 | 123.9 | 200-500 |
| Squat | 9 | 283 | 91.2 | 160-400 |
| Leg Curl | 8 | 104 | 47.8 | 40-180 |
| Toe Raises | 5 | 201 | 118.7 | 40-375 |
| Leg Extension | 8 | 166 | 45.0 | 65-200 |
| Stair Climb | 1 | 59 | --- | --- |
| OTHER EXERCISES | | | | |
| Other | 2 | 40 | 35.4 | 15- 65 |

Table 6. Characteristics of East Coast SEALs' weight training exercise (continued).

| Perceived Effort* | | | | |
|----------------------|----|------|-----|-------|
| EXERCISE | N | MEAN | SD | RANGE |
| UPPER BODY EXERCISES | | | | |
| Neck | 14 | 5.7 | 1.8 | 4-10 |
| Upright Rowing | 27 | 7.2 | 1.8 | 4-10 |
| Bent Rowing | 22 | 6.7 | 1.9 | 4-10 |
| Bench Press | 43 | 7.2 | 1.9 | 3-10 |
| Military Press | 32 | 7.3 | 1.6 | 4-10 |
| Incline Press | 35 | 7.4 | 1.7 | 4-10 |
| Biceps Curl | 42 | 7.3 | 1.9 | 3-10 |
| Triceps Curl | 39 | 7.4 | 1.8 | 3-10 |
| Latissimus Pull | 36 | 7.2 | 1.9 | 5-10 |
| Wrist Curl | 21 | 7.1 | 1.9 | 4-10 |
| Sit-up | 14 | 7.3 | 2.2 | 4-10 |
| LOWER BODY EXERCISES | | | | |
| Leg Press | 15 | 6.7 | 1.5 | 5-10 |
| Squat | 15 | 7.3 | 1.9 | 5-10 |
| Leg Curl | 17 | 6.8 | 2.0 | 4-10 |
| Toe Raises | 15 | 6.7 | 1.9 | 4-10 |
| Leg Extension | 17 | 6.9 | 1.9 | 5-10 |
| Stair Climb | 2 | 6.5 | 2.1 | 5- 8 |
| OTHER EXERCISES | | | | |
| Other | 6 | 6.8 | 2.0 | 4-10 |

* Perceived intensity scale: 1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Table 7. Summary of the characteristics of physical training activities of East Coast SEALs ordered by number of participants.

| ACTIVITY | ATTRIBUTE | N | % N | MEAN | SD |
|-----------------|-----------|----|-----|------|-----|
| Running | | | | | |
| | Frequency | 74 | 99 | 4.0 | 1.3 |
| | Intensity | 61 | 81 | 6.1 | 2.0 |
| | Duration | 73 | 97 | 4.6 | 1.3 |
| Swimming | | | | | |
| | Frequency | 72 | 95 | 1.8 | 1.2 |
| | Intensity | 59 | 79 | 5.3 | 2.1 |
| | Duration | 71 | 95 | 4.9 | 1.6 |
| Calisthenics | | | | | |
| | Frequency | 68 | 91 | 4.0 | 1.4 |
| | Intensity | 57 | 76 | 6.8 | 2.0 |
| | Duration | 70 | 93 | 5.5 | 1.4 |
| Obstacle Course | | | | | |
| | Frequency | 67 | 89 | 1.6 | 1.2 |
| | Intensity | 54 | 72 | 6.9 | 2.1 |
| | Duration | -- | -- | --- | --- |
| SCUBA/Snorkel | | | | | |
| | Frequency | 65 | 87 | 1.4 | 1.1 |
| | Intensity | 52 | 69 | 4.8 | 2.3 |
| | Duration | 65 | 87 | 5.6 | 1.9 |

Scales key

Frequency: 0-(never); 1-(> 0 & $\leq 1x/wk$); 2-($2x/wk$); 3-($3x/wk$); 4-($4x/wk$); 5-($5x/wk$); 6-($6x/wk$); 7-($\geq 7x/wk$)

Intensity: 1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Duration (minutes): 0-(N/A); 1-(< 11); 2-(11-20); 3-(21-30); 4-(31-40); 5-(41-50); 6-(51-60); 7-((61-119); 8-(120-180); 9-(> 180)

Table 7. Summary of the characteristics of physical training activities of East Coast SEALs ordered by number of participants (continued).

| ACTIVITY | ATTRIBUTE | N | % N | MEAN | SD |
|------------------------|-----------|----|-----|------|-----|
| Weight Training | | | | | |
| | Frequency | 62 | 83 | 2.9 | 1.6 |
| | Intensity | 53 | 71 | 6.8 | 2.1 |
| | Duration | 63 | 84 | 5.9 | 1.5 |
| Bicycling | | | | | |
| | Frequency | 46 | 61 | 2.5 | 1.7 |
| | Intensity | 37 | 49 | 5.0 | 2.2 |
| | Duration | 42 | 56 | 4.9 | 2.0 |
| Walking | | | | | |
| | Frequency | 17 | 23 | 3.8 | 2.7 |
| | Intensity | 14 | 19 | 3.2 | 1.9 |
| | Duration | 16 | 21 | 3.8 | 2.3 |
| Rowing | | | | | |
| | Frequency | 16 | 21 | 1.8 | 1.6 |
| | Intensity | 12 | 16 | 4.7 | 1.6 |
| | Duration | 15 | 20 | 4.5 | 2.1 |
| Aerobics Class | | | | | |
| | Frequency | 8 | 11 | 2.8 | 2.0 |
| | Intensity | 7 | 9 | 6.1 | 2.2 |
| | Duration | 8 | 11 | 4.6 | 1.9 |

Scales Key

Frequency: 0-(never); 1-(> 0 & $\leq 1x/wk$); 2-($2x/wk$); 3-($3x/wk$); 4-($4x/wk$); 5-($5x/wk$); 6-($6x/wk$); 7-($\geq 7x/wk$)

Intensity: 1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Duration (minutes): 0-(N/A); 1-(< 11); 2-(11-20); 3-(21-30); 4-(31-40); 5-(41-50); 6-(51-60); 7-((61-119); 8-(120-180); 9-(> 180)

Table 8. Summary of the characteristics of skilled/sport activities of East Coast SEALs ordered by frequency of participation.

| ACTIVITY | ATTRIBUTE | N | % N | MEAN | SD |
|------------------------|-----------|----|-----|------|-----|
| Volleyball | | | | | |
| | Frequency | 31 | 41 | 1.4 | 1.2 |
| | Intensity | 23 | 31 | 4.4 | 2.5 |
| | Duration | 31 | 41 | 6.0 | 1.9 |
| Racquet Sport/Handball | | | | | |
| | Frequency | 23 | 31 | 1.5 | 1.5 |
| | Intensity | 16 | 21 | 4.6 | 2.5 |
| | Duration | 23 | 31 | 5.5 | 1.6 |
| Baseball/Softball | | | | | |
| | Frequency | 22 | 29 | 1.8 | 1.6 |
| | Intensity | 19 | 25 | 3.7 | 2.1 |
| | Duration | 20 | 27 | 6.1 | 1.8 |
| Football | | | | | |
| | Frequency | 19 | 25 | 1.4 | 1.4 |
| | Intensity | 16 | 21 | 4.2 | 2.3 |
| | Duration | 18 | 24 | 6.2 | 1.6 |
| Martial Arts | | | | | |
| | Frequency | 15 | 20 | 2.8 | 1.8 |
| | Intensity | 11 | 15 | 5.4 | 2.7 |
| | Duration | 15 | 20 | 5.4 | 1.9 |

Scales Key

Frequency: 0-(never); 1-(> 0 & $\leq 1x/wk$); 2-($2x/wk$); 3-($3x/wk$); 4-($4x/wk$); 5-($5x/wk$); 6-($6x/wk$); 7-($\geq 7x/wk$)

Intensity: 1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Duration (minutes): 0-(N/A); 1-(< 11); 2-(11-20); 3-(21-30); 4-(31-40); 5-(41-50); 6-(51-60); 7-((61-119); 8-(120-180); 9-(> 180)

Table 8. Summary of the characteristics of skilled/sport activities of East Coast SEALs ordered by frequency of participation (continued).

| ACTIVITY | ATTRIBUTE | N | % N | MEAN | SD |
|------------------------|-----------|----|-----|------|-----|
| Boxing/Wrestling | | | | | |
| | Frequency | 12 | 16 | 1.8 | 1.8 |
| | Intensity | 0 | 0 | --- | --- |
| | Duration | 8 | 11 | 4.8 | 1.8 |
| Other Skilled Activity | | | | | |
| | Frequency | 6 | 8 | 2.8 | 2.1 |
| | Intensity | 5 | 7 | 7.4 | 0.9 |
| | Duration | 7 | 9 | 5.6 | 2.0 |

Scales Key

Frequency: 0-(never); 1-(> 0 & $\leq 1x/wk$); 2-($2x/wk$); 3-($3x/wk$); 4-($4x/wk$); 5-($5x/wk$); 6-($6x/wk$); 7-($\geq 7x/wk$)

Intensity: 1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Duration (minutes): 0-(N/A); 1-(< 11); 2-(11-20); 3-(21-30); 4-(31-40); 5-(41-50); 6-(51-60); 7-((61-119); 8-(120-180); 9-(> 180)

DISCUSSION

This report focused on physical training programs of East Coast SEALs. The principal aerobic and strength conditioning practices were documented by a questionnaire completed by SEALs. These data supplement information collected on physical profiles of BUD/S students and platoon SEALs (Beckett, et al., 1989), and on physical training activities of West Coast SEALs (Prusaczyk, et al., 1990). Additionally, a report by Stuster, et al. (1994) provides valuable information on the physically demanding tasks and missions SEALs may be required to perform.

The American College of Sports Medicine (ACSM) has published guidelines for the development and maintenance of cardiorespiratory (aerobic) and muscular (strength) fitness in healthy adults (American College of Sports Medicine, 1990). Unfortunately, these guidelines are based on average populations of Americans and may not be entirely applicable to very fit or elite

military populations, like SEALs. Both the high $\dot{V}O_{2peak}$ reported for platoon SEALs (Beckett, et al., 1989) and the results of this survey suggest that SEALs are able to maintain good cardiorespiratory fitness, despite the 8% average lower $\dot{V}O_{2peak}$ compared to BUD/S students. The ACSM guidelines suggest that to maintain aerobic fitness, exercise that involves repetitive contraction of large muscle masses (i.e., legs, arms, or both) should be performed at least three times per week, for twenty to thirty minutes per session, and at an intensity of at least 60% of $\dot{V}O_{2peak}$. On average, the SEALs in this study reported engaging in physical training activities that exceeded the levels required for maintenance of aerobic fitness. The mean values of frequency and duration reported in this survey were 4.1 times per week and 46 ± 13 minutes per session. Based on the mean minute-per-mile pace reported, mean $\dot{V}O_2$ during running (calculated for the average SEAL body weight of 175 lbs) would be 80% of the $\dot{V}O_{2peak}$ previously reported for platoon SEALs (Beckett et al., 1989). While this is slightly lower than the 85% $\dot{V}O_{2peak}$ reported for West Coast SEALs (Prusaczyk, et al., 1990), both intensities are well above the ACSM guidelines for maintenance of cardiorespiratory fitness.

Recent work by Jacobs, et al. (1994) demonstrated that SEALs can increase indicators of aerobic fitness and anaerobic capacity in as little as three weeks, training 30 minutes per day, three times per week. These data suggest that although SEALs report performing regular aerobic exercise surpassing ACSM guidelines, they could, with an effective training program, increase aerobic fitness. It has been reported that the quantity of aerobic activity is often perceived to be higher than it actually is, especially for very active individuals (Klesges, Eck, Mellon, Fulliton, Somes, & Hanson 1990). In this regard, it is possible that the exercise reported here may be somewhat higher than the actual exercise in which they regularly engage. However, based on the previous reports of SEALs' $\dot{V}O_{2peak}$ (Beckett, et al., 1989), it appears that SEALs maintain relatively high levels of aerobic fitness.

Limited scientific data are available on conditioning activities required to maintain muscular strength in fit individuals. However, it appears that even when training is discontinued or dramatically reduced, strength declines at a much slower rate than the rate at which it was gained (Fleck & Kramer, 1987). Further research is required to determine the exact loading, frequency, and type of program (e.g., sets and repetitions per set) needed to maintain individual-specific training gains in muscular strength. ACSM guidelines propose training at least two days

per week with 8 to 12 repetitions of each exercise per session to maintain muscular strength. The East Coast SEALs in this study performed weight training exercises in quantities sufficient to meet these guidelines. Weight training was performed with a mean frequency of 2.9 times per week with approximately 10 repetitions per set over an average of 4 sets per session.

Many SEAL tasks require not only muscular strength and endurance but also muscular power (Stuster, et al., 1994). It appears that muscular strength is maintained for at least four weeks when training frequency is reduced from six to one time per week; however, significant reductions (13.6%) in muscular power occurred when the frequency was reduced to three times per week (Neufer, Costill, Fielding, Flynn, & Kirwin, 1987). As with aerobic training, to maintain muscular strength, the most important characteristic of exercise is intensity (Fleck & Kramer, 1987). SEALs in this survey reported that on average the intensity of effort during weight training was between "difficult" and "intense." These reports would suggest that, in combination with the frequencies and durations reported, these SEALs will maintain levels of muscular strength. Thus, to meet the complex and diverse mission demands, it is important that the intensity of strength training be maintained to avoid loss of muscular power, especially during time of intense operational training or while deployed aboard submarines.

Natural endowment (genetic factors) plays a major role in an individual's performance capacity (Åstrand & Rodahl, 1977). However, given the right endowment, there is little doubt that proper training can further enhance physical performance and physical capacity. The principal challenge for future research is to develop training programs that most effectively use the limited time and equipment available to SEALs for developing and maintaining mission-related fitness.

REFERENCES

- American College of Sports Medicine. (1990). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Medicine and Science in Sports and Exercise*, 22(2), 265-274.
- Åstrand, P. O., & Rodahl, K. (1977). *Textbook of Work Physiology*. New York: McGraw-Hill Book Company.
- Barnes, L., & Strauss, R. H. (1986). The U.S. Navy SEAL team: Total commitment to total fitness. *Physician and Sportsmedicine*, 14, 176-183.
- Beckett, M. B., Goforth, H. W., & Hodgdon, J. H. (1989). *Physical fitness of U.S. Navy special forces team members and trainees*. (Report No. 89-29). San Diego, CA: Naval Health Research Center.
- Carter, J. E. L. (1980). The Heath-Carter Method. Available from: San Diego State University Syllabus Service, San Diego, CA.
- Carter, J. E. L., & Rahe, R. H. (1973). Effects of stressful underwater demolition training on body structure. *Medicine and Science in Sports and Exercise*, 7(4), 304-308.
- Fleck, S. J., & Kraemer, W. J. (1987). *Designing Resistance Training Programs*. Champaign, IL: Human Kinetics Books.
- Jacobs, I., Prusaczyk, W. K., & Goforth, H. W. (1994). *Adaptations to three weeks of aerobic/anaerobic training in West Coast U.S. Navy Sea-Air-Land Personnel (SEALs)*. (Report No. 94-28). San Diego, CA: Naval Health Research Center.
- Klesges, R. C., Eck, L. H., Mellon, M. W., Fulliton, W., Somes, G. W., & Hanson, C. L. (1990). The accuracy of self-reports of physical activity. *Medicine and Science in Sports and Exercise*, 22, 690-697.
- Muza, S. R., Sawka, M. N., Young, A. J., Dennis, R. C., Gonzalez, R. R., Martin, J. W., Pandolf, K. B., & Valeri, C. R. (1987). Elite special forces: physiological description and ergogenic influence of blood reinfusion. *Aviation Space and Environmental Medicine*, 58, 1001-1004.
- Neufer, P. D., Costill, D. L., Feilding, R. A., Flynne, M. G., & Kirwin, J. P. (1987). Effect of reduced training on muscular strength and endurance in competitive swimmers. *Medicine and Science in Sports and Exercise*, 19(5), 486-490.

- Prusaczyk, W. K., Goforth, H. W., & Nelson, M. L. (1990). *Characteristics of physical training activities of West Coast U.S. Navy Sea-Air-Land personnel (SEALs)*. (Report No. 90-35.) San Diego, CA: Naval Health Research Center.
- Stuster, J. W., Goforth, H. W., & Prusaczyk, W. K. (1993). *Task analysis of the SEAL Delivery Vehicle (SDV) pilot and navigator crew positions*. (Contractor's report). Santa Barbara, CA: Anacapa Sciences, Inc., P. O. Box 519, Santa Barbara, CA 93102.
- Stuster, J. W., Goforth, H. W., Prusaczyk, W. K., & Meyer, L. T. (1994). *Analysis of the most physically demanding missions and tasks performed by Navy SEALs*. (Contractors Report). Santa Barbara, CA: Anacapa Sciences, Inc. P. O. Box 519, Santa Barbara, CA 93102.

APPENDIX A
PHYSICAL ACTIVITY QUESTIONNAIRE

PHYSICAL ACTIVITY QUESTIONNAIRE

Name _____ Date _____

Height _____ Weight _____ Age _____ Organization _____

Years of experience in a SEAL Team _____ Social Security Number _____

CURRENT PHYSICAL ACTIVITY

The following questions are designed to provide information about exercise habits. Please read the instructions carefully and complete this questionnaire to the best of your ability.

Circle the number that most closely represents your present status:

- | | | | |
|---------------------|-----|---------------------------|-----|
| Combat Swimmer | - 1 | Land Warfare | - 2 |
| Maritime Operations | - 3 | Exercises | - 4 |
| Field Activities | - 5 | Cold Weather Training | - 6 |
| Classroom | - 7 | Stand Down or Preparation | - 8 |
| Other | - 9 | | |

For SDV Team only:

- | | | | |
|---------------|------|-----|------|
| Core Training | - 10 | AOT | - 11 |
|---------------|------|-----|------|

A. Frequency of Exercise (How many times per week or month do you exercise?)

Intensity - In the blank space next to selected frequency, place the number that best describes the intensity of each particular exercise:

1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

| | Never | 1-4X Per Month | 2X Per Week | 3X Per Week | 4X Per Week | 5X Per Week | 6X Per Week | 7X Per Week or More |
|----------------------------|-------|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|
| 1. Running | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 2. Scuba/snorkeling | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 3. Swimming | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 4. Bicycling | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 5. Rowing | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 6. Continuous walking | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 7. Aerobic exercise class | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 8. Weightlifting | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 9. Calisthenics | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 10. Racket sports/handball | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 11. Basketball | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 12. Baseball/softball | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 13. Football | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 14. Volleyball | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 15. Boxing/wrestling | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 16. Martial arts | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 17. Obstacle course | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |
| 18. Other (specify: _____) | 0 | 1__ | 2__ | 3__ | 4__ | 5__ | 6__ | 7__ |

B. Duration of Workouts (What is the average time per session you spend exercising?)

| | Not Appli- cable | Less Than 11 Minutes | 11-20 Minutes | 21-30 Minutes | 31-40 Minutes | 41-50 Minutes | 51-60 Minutes | 61-119 Minutes | 2-3 Hours | More Than 3 Hours |
|----------------------------|------------------------|----------------------------|------------------|------------------|------------------|------------------|------------------|-------------------|--------------|-------------------------|
| 1. Running | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2. Scuba/snorkeling | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 3. Swimming | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 4. Bicycling | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 5. Rowing | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 6. Continuous walking | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 7. Aerobic exercise class | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 8. Weightlifting | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 9. Calisthenics | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10. Racket sports/handball | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 11. Basketball | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 12. Baseball/softball | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 13. Football | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 14. Volleyball | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 15. Boxing/wrestling | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 16. Martial arts | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 17. Other (specify: _____) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

C. Exercise History (How long have you been on this or a similar schedule?)

| | Not Appli- cable | Less Than 1 Month | 1-3 Months | 4-11 Months | 1-2 Years | 3-4 Years | 5 Years or More |
|----------------------------|------------------------|-------------------------|---------------|----------------|--------------|--------------|--------------------|
| 1. Running | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. Scuba/snorkeling | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. Swimming | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. Bicycling | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. Rowing | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. Continuous walking | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. Aerobic exercise class | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. Weightlifting | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. Calisthenics | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. Racket sports/handball | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. Basketball | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. Baseball/softball | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. Football | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. Volleyball | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. Boxing/wrestling | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. Martial arts | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. Other (specify: _____) | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

D. Exercise Surfaces/Equipment (How often do you exercise on these surfaces/use this equipment?)

| | Not Appli- cable | 1-4X Per Month | 2X Per Week | 3X Per Week | 4X Per Week | 5X Per Week | 6X Per Week | 7X Per Week or More |
|---|------------------------|----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|
| 1. Run on soft sand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Run on hard sand or packed dirt | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. Run on grass | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Run on asphalt | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Run on concrete | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. Run on artificial track surface | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. Scuba/snorkel in pool | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. Scuba/snorkel in ocean | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. Scuba/snorkel with fins | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. Scuba/snorkel without fins | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. Swim in pool | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. Swim in ocean | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. Swim with fins | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. Swim without fins | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. Bicycle on the road | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. Bicycle on a stationary cycle | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. Row a boat or shell | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. Row on a machine | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. Play racket sports/handball on wood | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. Play racket sports/handball on asphalt | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. Play racket sports/handball on concrete | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. Play basketball on wood | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 23. Play basketball on asphalt | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. Play basketball on concrete | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 25. Play volleyball on sand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 26. Play volleyball on grass | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 27. Play volleyball on wood | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 28. Play volleyball on asphalt | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 29. Play volleyball on concrete | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

E. Running Pace and Mileage (No Load)

(Please skip any section not applicable to your training)

1. During your continuous running, what is your usual pace in minutes per mile? _____ : _____
min. sec.
2. How many miles per week do you usually run? _____ miles
3. What is the total time per day you spend running? _____ minutes
4. How many times per week do you run? _____ times/week

F. Running/Walking Pace and Mileage (With Load)

1. During your continuous running/walking with a load, what is your usual pace in minutes per mile?

Running _____ : _____ Walking _____ : _____
min. sec. min. sec.

2. How many miles per week do you travel with this load?

Running _____ miles Walking _____ miles

3. What is the average weight of this load? _____ pounds
4. What is your body weight? _____ pounds
5. How do you usually carry this load? (check one)

Hands _____
Backpack _____
Hippack _____
Over Shoulder _____
Other (specify) _____

6. Percent of body weight carried? _____ percent.
(please leave blank)

G. Scuba/Snorkeling Pace and Mileage

(If you do not scuba or snorkel, go to Section H)

1. When you scuba/snorkel to arrive at a particular destination, what is your usual pace in minutes per mile? _____ : _____
min. sec.
2. How many miles per week do you usually cover using scuba/snorkel? _____ miles

H. Weightlifting (If you do not lift weights, skip this section)

Repetition = one complete exercise movement

Set = a number of continuous repetitions

1-repetition maximum = the greatest weight that can be lifted in one repetition

Intensity (In this column, place the number that best describes the intensity of each particular exercise):

1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Modality (In this column, place the number that best describes the modality of each particular exercise):

1-free weights; 2-universal; 3-nautilus; 4-friction or hydraulic resistance; 5-other

IF YOUR SETS, REPETITIONS, OR LOADS VARY, USE THE AVERAGE FOR YOUR RESPONSE TO THESE QUESTIONS

Body Weight: _____ pounds

| Exercise | 1 Repetition Maximum | Sets | Repetitions | Intensity | Average Weight | Duration* | Modality |
|---------------------|-------------------------|-------|-------------|-----------|-------------------|-----------|----------|
| Neck | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Upright Rowing | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Bent Rowing | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Bench Press | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Military Press | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Incline Press | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Biceps Curl | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Triceps Curl | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Wrist Curl | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Sit-up with weights | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Leg Press | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Squat | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Leg Curl | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Toe Raises | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Latissimus Pull | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Leg Extension | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Stair Climb | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| Others (specify) | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ | _____ | _____ | _____ | _____ |

*Entire time spent performing this exercise, including rest between sets.

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| 13. ABSTRACT (Maximum 200 words) This survey documents the aerobic and strength conditioning programs of East Coast Navy SEALs and evaluates the effectiveness of training programs. 75 East and 102 West Coast SEALs completed a detailed physical training activity questionnaire. Questions documented the type, duration, frequency, and intensity of exercise and the locations/facilities where the SEALs trained. The activities were evaluated according to American College of Sports Medicine guidelines for developing and maintaining aerobic and strength fitness. East and West Coast SEALs train with sufficient volume and intensity to maintain current levels of aerobic fitness. Strength conditioning was also sufficient to maintain muscular strength. The findings indicate that East Coast SEALs spent significantly ($p \leq 0.05$) more time than West Coast SEALs engaged in aerobic exercises. East Coast SEALs performed calisthenics with greater ($p \leq 0.05$) frequency, intensity, and duration than West Coast SEALs, and ran the obstacle course with significantly greater frequency and intensity. The effectiveness of current training programs should be evaluated to ensure SEALs' ability to meet the most physically demanding tasks they may be required to perform. Additionally, physical training programs for SEALs must be evaluated to ensure they avoid detraining under conditions where appropriate equipment and training opportunities are limited (e.g., shipboard and submarine deployments). | | | | |
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